PERFORMANCE REPORT

As Required by

FEDERAL AID IN SPORT FISH RESTORATION ACT

TEXAS

FEDERAL AID PROJECT F-221-M-2

STATEWIDE FRESHWATER FISHERIES MONITORING AND MANAGEMENT PROGRAM

2011 Survey Report

Lake Tyler East

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July 31, 2012

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SURVEY AND MANAGEMENT SUMMARY

Fish populations in Lake Tyler East were surveyed in 2011 using electrofishing and trap netting and in 2012 using gill netting. Vegetation and angler access surveys were conducted in August 2011. A roving creel survey, conducted from March 2012 through May 2012 collected angler use and harvest information. This report summarizes results of the surveys and contains a management plan based on those findings.

- **Reservoir Description:** Lake Tyler East is a 2,276-acre reservoir on Mud Creek, Texas, a tributary of the Angelina River. Boat access was compromised at the three boat ramps during the survey due to low water conditions. Bank access was available at several city parks. Although facilities are generally accessible to handicapped, none of the facilities provided were specifically marked as ADA approved. Littoral habitat was sparse in the lower half of the reservoir, consisting mainly of featureless shoreline with boat docks. A narrow fringe of native emergent vegetation has historically been present in the upper end of the reservoir (above the SH 64 bridge); however, this area was inaccessible due to low water levels during the current survey.

- **Management History:** Important sport fish include largemouth bass, white bass, channel catfish, white crappie, and black crappie. Supplemental largemouth bass sampling was conducted in 2009, and stockings were conducted in 2009 and 2011. A hydrilla management plan was submitted to Tyler Water Utilities (TWU) in July 2006 but was revised in 2008. Marginal (up to 200 feet from shore) hydrilla treatments were conducted in 2007 and annually from 2009-2011. A roving creel survey was conducted from March through May 2012.

- **Fish Community**
  - **Prey species:** Threadfin shad were present in the reservoir, and electrofishing catch rate was higher than it was in in previous surveys. Size distribution of gizzard shad was better than it was in previous surveys. Electrofishing catch rates of sunfishes ≤ 4 inches were high, indicating excellent prey availability for sport fishes.

  - **Catfishes**: Channel catfish still receive little directed angling effort. All catfish collected during gill netting were of harvestable size and no evidence of natural recruitment was observed. Catfish made up a small percentage of the directed angler effort.

  - **White bass:** White bass were lower in abundance than they were in the previous survey, but multiple year classes were present, indicating continued recruitment. No directed effort for white bass was recorded.

  - **Largemouth bass:** Largemouth bass continued to be the most sought after species by anglers at Lake Tyler East during the 2012 spring-quarter creel survey. Electrofishing catch rate of fish ≥8 inches was similar to that of previous surveys. Size distribution, body condition, and growth were good.

  - **Crappie:** Crappie were the second-most sought after sport fish group during the spring creel survey in 2012. Both white crappie and black crappie were present, but trap net catches of both species continue to be low. Body conditions for both species were good.

- **Management Strategies:** Continue biennial electrofishing; stock Florida strain largemouth bass as warranted. Continue annual vegetation monitoring. Promote Lake Tyler East angling opportunities through news releases. Continue providing TWU with information about the threat of invasive species.

INTRODUCTION

This document is a summary of fisheries data collected from Lake Tyler East from June 2011 through May 2012. The purpose of this document is to provide fisheries information and make management recommendations to protect and improve the sport fishery. While information on other species of fish was collected, this report deals primarily with major sport fishes and important prey species. Historical data are presented with the 2011-2012 data for comparison.

Reservoir Description

Lake Tyler East is a 2,276-acre reservoir on Mud Creek, a tributary of the Angelina River in Texas. The reservoir was built by Tyler Water Utilities (TWU) to provide water for municipal and industrial purposes. Boater access is typically good with three public ramps and bank angler access available at several city parks. However, access was compromised during the survey year due to low water conditions (Figure 1), and anglers were required to launch from Lake Tyler West reservoir and enter Lake Tyler East via the canal. Although facilities were generally accessible to handicapped persons, none of the facilities provided were specifically marked as American Disabilities Act approved. Littoral habitat was sparse in the lower half of the reservoir, consisting mainly of featureless shoreline with boat docks (Ott and Bister 2004). Historically, a narrow fringe of native emergent vegetation has been present above the Hwy 64 bridge and in the back of coves along the east side of the reservoir. However, due to low water conditions in summer 2011, most of this vegetation was exposed and did not contribute to in-lake habitat. Hydrilla *(Hydrilla verticillata)* was identified in trace amounts in the 2003 vegetation survey. This species rapidly expanded during the drought of 2005 and 2006, occupying 1,328 acres (58% coverage) by August 2006 (Beck and Ott 2008). Combined herbicide treatment conducted by TWU and severe flooding in summer 2007 reduced coverage to trace amounts of hydrilla by August 2007; thus, no control was necessary in 2008. Hydrilla began expanding again in 2009 and was controlled by herbicide annually from 2009-2011. However, control was limited to a maximum 200 feet from shore and only in front of residences in an effort to compromise with angler interests. Lake Tyler East is eutrophic with a mean TSI *chl-a* of 50.5 (Texas Commission on Environmental Quality 2008). Other descriptive characteristics for Lake Tyler East are found in Table 1.

Management History

Previous management strategies and actions: Management strategies and actions from the previous survey report (Beck and Ott 2008) included:

1. Continue electrofishing on a biennial basis to monitor and evaluate population. Conduct supplemental daytime electrofishing if necessary to collect at least 30 age-0 largemouth bass *(Micropterus salmoides)* and assess the success of Florida largemouth bass *(M. s. floridanus)* stockings of 2008.
   Action: Supplemental electrofishing was conducted in 2009, and standard electrofishing was conducted in 2011; a sample of 30 largemouth bass was collected and submitted for genetic analysis in 2011.
2. Continue to survey hydrilla coverage during the spring and summer each year. Coordinate with controlling authority to begin native plant establishment project.
   Action: Bi-annual hydrilla surveys have been conducted since 2005. Results have been submitted to Tyler Water Utilities, and assistance has been provided in preparing hydrilla treatment plans. A funding proposal for native vegetation enhancement was submitted to the Southeast Aquatic Resources Partnership (SARP) in 2010 but was not accepted.
3. Promote the newly established white bass *(Morone chrysops)* fishery in news releases in the greater Tyler area. Give presentations to groups and area residents.
   Action: News releases have been prepared and submitted. No presentations specific to the fishery have been made.

Harvest regulation history: Sport fishes in Lake Tyler East are currently managed with statewide harvest regulations (Table 2). Regulations have not changed since the last survey in 2008.

Stocking history: Florida largemouth bass are the most frequently stocked species at Lake Tyler East. Florida largemouth bass were initially stocked in 1979 and were restocked in 2002-2003, 2008-2009, and 2011. A complete stocking history is found in Table 3.

Vegetation/habitat history: Aquatic vegetation at Lake Tyler East has traditionally occupied ~10% of the reservoir. A narrow fringe of maidencane *(Panicum hemitomon)* is typically present when water level is at full pool. Littoral habitat is typically more abundant in the upper third of the reservoir (adjacent to the Hwy 64 bridge), including native emergent floating-leaved vegetation such as American lotus *(Nelumbo lutea)*, white water-lily *(Nymphaea odorata)*, and spatterdock *(Nuphar luteum)*. Alligatorweed *(Alternanthera philoxeroides)* is also abundant above the Hwy 64 Bridge and in the back of coves along the east side. Hydrilla was identified in trace amounts in the 2003 vegetation survey. This species rapidly expanded during the drought of 2005 and 2006, occupying 1,328 acres (58% coverage) by August 2006 (Beck and Ott 2008). A combination of herbicide treatment conducted by TWU and severe flooding in summer 2007 reduced coverage to trace amounts by August 2007; no control was necessary in 2008. Hydrilla began expanding again in 2009 and was controlled by herbicide annually from 2009-2011. However, control was limited to a maximum 200 feet from shore and in front of residences in an effort to compromise with anglers. The physical habitat types have remained consistent over the last decade; the rate of shoreline development has stabilized.

Water transfer: Lake Tyler East is used primarily as a water supply for municipal and industrial purposes and for flood control. The pump station for Tyler Water Utilities is located on Lake Tyler West. A canal connects Lake Tyler East to Lake Tyler West, facilitating flow to the pump station and allowing raw reservoir water to be pumped directly to the treatment facility. Tyler Water Utilities maintains a second permanent pump station and treatment facility on Lake Palestine. Water from the two sources is blended after leaving the treatment facilities but prior to distribution. Tyler Water Utilities provides treated water to the City of Whitehouse.

METHODS

Fishes were collected by electrofishing (1 hour at 12, 5-min stations), gill netting (5 net nights at 5 stations), and trap netting (5 net nights at 5 stations). Catch per unit effort (CPUE) for electrofishing was recorded as the number of fish caught per hour (fish/h) of actual electrofishing and as the number of fish per net night (fish/nn) for gill and trap nets. All survey stations were randomly selected, and all surveys were conducted according to the Fishery Assessment Procedures (TPWD, Inland Fisheries Division, unpublished manual revised 2011). A vegetation survey and angler access survey were conducted in August 2011.

Roving creel surveys were conducted from December 2004 through February 2005, March through May 2008, and March through May 2012. Surveys consisted of 9 creel days per quarter (4 weekdays and 5 weekend days); angler counts were assumed to be instantaneous and were conducted one hour after start time survey day. Percent legal largemouth bass released was calculated separately for tournament anglers and non-tournament anglers. All survey dates were randomly selected, and all surveys were conducted according to the Fishery Assessment Procedures (TPWD, Inland Fisheries Division, unpublished manual revised 2011).

Sampling statistics (CPUE for various length categories), structural indices [Proportional Size Distribution (PSD) as defined by Guy et al. (2007)], and condition indices [relative weights (W_r)] were calculated for target fishes according to Anderson and Neumann (1996). Index of vulnerability (IOV) was calculated for gizzard shad *(Dorsoma cepedianum)* (DiCenzo et al. 1996). Relative standard error (RSE = 100 X SE of the estimate/estimate) was calculated for all CPUE statistics and SE was calculated for structural indices and IOV. For white bass, ages were determined from otoliths taken from all fish collected (N=24), and their lengths ranged from 9.5-16.1 inches. Largemouth bass ages were determined from otoliths taken from 78

specimens and their lengths ranged from 5.3-19.3 inches. For black crappie (*P. nigromaculatus*), ages were determined using otoliths from 10 specimens ranging from 9.4-10.8 inches collected by angling in March 2012. Water level data were obtained from the United States Geological Survey web site (USGS 2012).

RESULTS AND DISCUSSION

Habitat: Species specific (hydrilla) surveys were conducted in spring 2008-2011 and comprehensive vegetation surveys of the littoral zone were conducted in August 2008-2011. In April 2011, hydrilla and coontail *(Ceratophyllum demersum)* covered 406 acres (18% total coverage), but drought conditions in 2011 resulted in unusually low water levels through early 2012 (Figure 1). TWU conducted a 257-acre herbicide treatment in May 2011, but due to water level drop much of the 200-foot treatment zone was exposed by late summer. In August 2011, the comprehensive vegetation survey was conducted with water level five feet below conservation pool. Hydrilla coverage had declined to 23 acres interspersed with coontail (Table 4). Coontail and chara *(Chara vulgaris)* had become the dominant species, occupying 492 acres (21%) of the reservoir. Although four acres of American lotus was still growing in the wetted zone, most of the emergent species observed in the spring were exposed.

Creel: Total angling effort for all species declined from 35,111 angler hours in 2008 to 18,843 angler hours in 2012. Low water conditions early in the spring creel period likely limited access to the reservoir, and thus resulted in a decline in angling effort (Figure 1). None of the boat ramps on Lake Tyler East were accessible, and anglers were forced to launch on Lake Tyler West and travel through the adjoining canal to access the east reservoir. Despite the decline in overall effort, anglers spent a similar amount to fish during spring quarter 2012 ($192,004) when compared to $237,881 in 2008 (Table 6).

Prey species: Both threadfin shad (*D. petenense)* and gizzard shad were present in Lake Tyler East (Appendix A). The combined electrofishing catch rate of gizzard and threadfin shad was 433/h. Unlike in the 2007 survey where the gizzard shad population was composed primarily of fish greater than eight inches (Figure 2), Index of Vulnerability in 2011 was 92, indicating that most were of a suitable prey size. Catch per unit effort (CPUE) for sunfishes during fall electrofishing was also very high (2,230/h). Bluegill *(Lepomis macrochirus)* comprised a majority of the catch with a CPUE of 1,633/h. Redear sunfish (*L. microlophus*) had the second highest catch rate (432/h); longear sunfish *(L. megalotis)*, and redbreast sunfish (*L. auritus*) were also collected but at somewhat lower catch rates. The size distributions of sunfish were skewed toward fish <5 inches (Figures 3-5), primarily functioning as prey. Sunfish only accounted for 1% of the total angling effort in spring 2012 (Table 5).

Catfish: Lake Tyler East traditionally supports a low abundance of channel catfish (*Ictalurus punctatus)* with poor natural recruitment. Gill net catch rate of channel catfish in 2012 (3.8/nn) was similar to that reported in 2004 (4.4/nn) but above 2008 (0.6/nn). All fish collected in 2012 were mature fish from 11 inches to 16 inches (Figure 6). Recruitment of channel catfish is thought to be limited because of high largemouth bass predation and a lack of suitable spawning habitat. Approximately 2% of the total angling effort was directed toward catfish in spring 2012 (Table 5), and overall harvest of catfish was only an estimated 103 fish (Table 7).

White bass: Gill net catch rate of white bass (4.8/nn) was lower than the 23.8/nn recorded in 2008 but is still above the single specimen that was collected in 2004 (Figure 8). Although white bass were first stocked into Lake Tyler West in 1993 (and likely entered Lake Tyler East via the connecting canal), none were collected until 2004. Beck and Ott (2008) suggested that the high gill net catch rate of white bass in 2008 was related to above average rainfall in the spring of 2007. Age distribution of the 24 fish collected (Figure 9) suggests that recruitment is continuing in most years; no 2009 year-class was represented in the sample. White bass began recruiting into the legal length ($\geq$10 inch) range by age 1 and were fully recruited by age 2. Mean relative weight (W_r) of white bass in 2012 was at or above 90 for all size classes, indicating adequate prey availability. Although white bass have been present in gill net samples since 2004, no directed angling effort for this species was detected in the spring 2012 creel survey.

Largemouth bass: Overall electrofishing catch rate of largemouth bass in 2011 (115/h) was lower than in 2007 (268/h) but higher than it was in 2009 (54/h). However, catch rate of stock-size largemouth bass was similar to that of the previous two surveys (Figure 10). Size distribution continues to be very good for a population managed under the statewide 14-inch minimum length, 5 fish/day harvest limit. Proportional size distribution (PSD) was 51 and is within the target range of 40–70. Mean relative weight (W_r) was above 90 for all length classes, indicating adequate prey availability and low intra-specific competition. Largemouth bass in Lake Tyler East fully recruited into the legal length range ($\geq$14 inch) by age 3 (Figure 11) and the growth trajectory to age 6 was reasonably linear. Despite stockings of Florida strain largemouth bass in 2008, 2009, and 2011 (Table 3), no pure Florida bass were included in the 30 fish sample collected in fall 2011 (Table 9). However, the percentage of Florida bass alleles in the population has continued to increase. The largemouth bass fishery at Tyler East is the most popular of any species, making up 80% of the directed effort during the spring 2012 creel (Table 5). Although directed effort (15,129 angler hours) declined when compared to 2008 (29,598 angler hours), the catch rate was relatively high (1.4/h) (Table 8). Largemouth bass temporarily retained during live-release angling tournaments made up approximately 74% of the measured harvest (Figure 12); overall, anglers immediately released approximately 54% of all legal length fish caught (Table 8).

Crappie: Lake Tyler East continues to maintain a low abundance but stable crappie fishery. Both white crappie *(P. annularus)* and black crappie *(P. nigromaculatus)* were collected in 2011. Only two black crappie and three white crappie were collected by trap net (Figures 12 and 13). Mean W_r of black crappie was $\geq$ 90, indicating good body condition but no legal length specimens were collected. Mean W_r of white crappie was higher ($\geq$ 100) and legal-length white crappie were collected. The average age for 10-inch black crappie collected in March 2012 was 4.1 years (N=10, range 2-5 years). Due to insufficient sample size, current age and growth data were unobtainable for white crappie. However, historical data indicate that most white crappie reach legal length by their third growing season (Ott and Bister 2004). Despite having a low-density crappie population, anglers utilize this resource during winter months when crappies congregate at the lower end of the reservoir. Directed angler effort for crappie (1,999 hours) was similar to that reported in 2008 (2,208), but angler catch rate (5.7/h) was much higher (Table 10). Black crappie made up the majority of the crappie species harvested (Table 10), and most of the crappie harvested were at or slightly above the legal length of 10 inches (Figure 15). This suggests rapid exploitation of crappie as they recruit into the legal size range or inconsistent recruitment.

Fisheries management plan for Lake Tyler East, Texas

Prepared – July 2012

ISSUE 1: Lake Tyler East has traditionally provided a high-quality largemouth bass fishery, and it is important to local anglers.

MANAGEMENT STRATEGIES

1. Continue to conduct biennial electrofishing surveys to monitor largemouth bass and prey populations and to conduct genetic analysis of the population.
2. Continue requesting Florida strain largemouth bass for stocking based on exhibited ability to produce trophy specimens.

ISSUE 2: Hydrilla has historically been problematic on Tyler East, occupying up to 60% of the reservoir. A management plan was developed then modified in 2008 as a compromise with anglers to define the treatment zone as only up to 200 feet from shore and only where residences exist. Changes in species dominance of aquatic vegetation were recorded in 2011 with native submersed vegetation becoming more prevalent.

MANAGEMENT STRATEGIES

1. Continue annual monitoring of Lake Tyler East vegetation community as necessary.
2. Continue providing Tyler Water Utilities with information regarding overall coverage and spatial distribution of plant species.

ISSUE 3: Continued recruitment of white bass offers the opportunity for an additional fishery but has the potential to be an issue of concern to some anglers.

MANAGEMENT STRATEGY

1. Promote this fishery in news releases in the Greater Tyler area. Make information available to the public to clarify issues relating to inter-specific competition with largemouth bass.

ISSUE 4: Many invasive species threaten aquatic habitats and organisms in Texas and can adversely affect the state ecologically, environmentally, and economically. For example, zebra mussels (*Dreissena polymorpha*) can multiply rapidly and attach themselves to any available hard structure, restricting water flow in pipes, fouling swimming beaches, and plugging engine cooling systems. Invasive vegetation species such as giant salvinia (*Salvinia molesta*) can form dense mats, interfering with recreational activities like fishing, boating, skiing, and swimming. The financial costs of controlling and/or eradicating these types of invasive species are significant. Additionally, the potential for invasive species to spread to other river drainages and reservoirs via watercraft and inter-basin transfer of water is a serious threat to all public waters of the state.

MANAGEMENT STRATEGIES

1. Coordinate with Tyler Water Utilities to post appropriate signage at access points around the reservoir.
2. Contact and educate local outdoor oriented businesses about invasive species and provide posters, literature, etc. so that they can in turn educate their customers.
3. Educate the public about invasive species through the use of media and the internet.
4. Make a speaking point about invasive species when presenting to constituents and user groups.
5. Map existing and future inter-basin water transfers to facilitate potential invasive species responses.
6. Conduct a quantitative assessment of the aquatic plant community during routine habitat survey in 2014.

SAMPLING SCHEDULE JUSTIFICATION:

The proposed sampling schedule includes annual vegetation survey, additional electrofishing in 2013, and routine gill netting and access surveys in 2015-2016 (Table 11). Additional vegetation surveys will be conducted as required.

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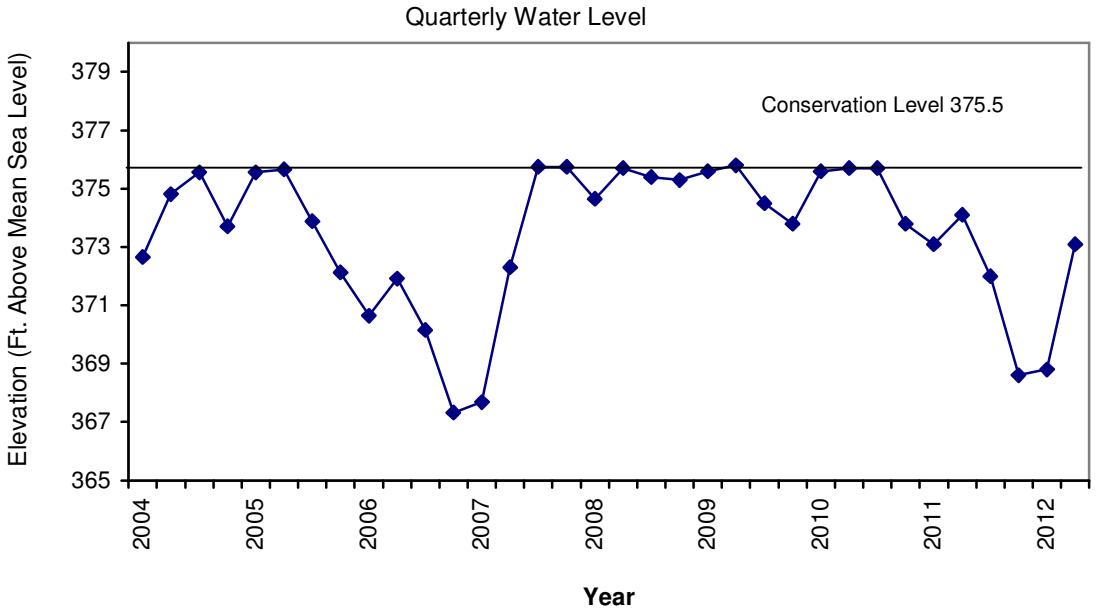


Figure 1. Quarterly water level elevations in feet above mean sea level (MSL) recorded for Lake Tyler East, Texas. Horizontal line represents conservation level.

Table 1. Characteristics of Lake Tyler East, Texas.

Characteristic	Description
Year completed	1967
Controlling authority	Tyler Water Utilities
Counties	Smith (dam)
Reservoir type	City Lake
Shoreline Development Index (SDI)	5.0
Conductivity	100 umhos/cm

Table 2. Harvest regulations for Lake Tyler East, Texas.

Species	Bag Limit	Minimum-maximum length (inches)
Catfish: channel and blue, their hybrids and subspecies	25 (in any combination)	12-No limit
Catfish, flathead	5	18-No limit
Bass, white	25	10-No limit
Bass, largemouth	5	14-No limit
Crappie: white and black, their hybrids and subspecies	25 (in any combination)	10-No limit

Table 3. Stocking history of Lake Tyler East, Texas. Size categories are FRY <1 inch; FGL =1-3 inches.

Species	Year	Number	Size
Blue catfish	1971	8,569	FGL
	1975	25,000	FGL
		33,569	
Channel catfish	1967	24,000	FGL
	1969	137,600	FGL
		161,600	
Palmetto bass	1975	25,000	FGL
	1977	13,840	FGL
	1979	25,000	FGL
	1983	25,930	FGL
		89,770	
Largemouth bass	1974	120,200	FGL
		120,200	
Florida Largemouth bass	1979	2,470	
	2002	120,824	FGL
	2003	34,040	FRY
	2008	113,812	FGL
	2009	113,780	FGL
	2011	115,650	FGL
	2012	120,448	FGL
		741,472	
Blue catfish	1971	8,569	FGL
	1975	25,000	FGL
		33,569	
Channel catfish	1967	24,000	FGL
	1969	137,600	FGL

Table 4. Vegetation survey was conducted in 2011. Surface area (acres) and percent of reservoir surface area was determined for each type of aquatic vegetation found. Water level at the time of survey was five feet below conservation pool. In mixed colonies, the first species listed was dominant.

Shoreline habitat type	Surface area	
	Acres	Percent of reservoir surface area
Native emergent		
American lotus	4	0.2
Native submerged		
chara	45	2.0
coontail/chara	447	19.6
Non-native		
hydrilla	17	0.7
coontail/hydrilla	6	0.3
Total	519	22.8

Table 5. Percent directed angler effort by species for Lake Tyler East, Texas December 2004 through February 2005, March 2008 through May 2008, and March 2012 through May 2012.

Species	Year		
	Winter 2004/2005*	Spring 2008	Spring 2012
temperate basses	0	0	0
largemouth bass	52	84	80
crappie spp.	46	6	11
catfish spp.	0	1	2
sunfish	0	<1	1
anything	1	8	6

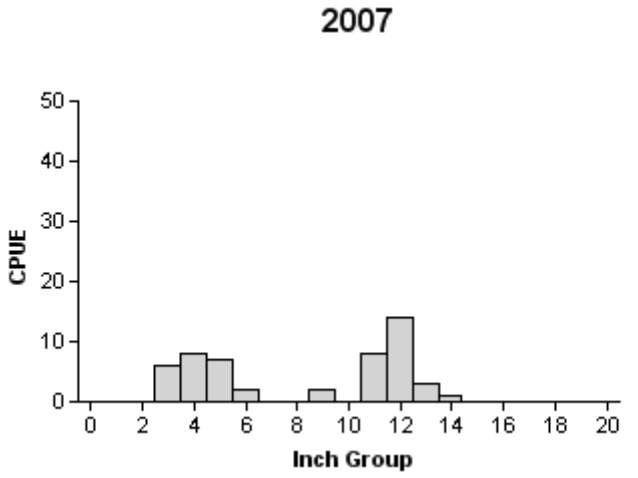
* Winter creel conducted from December through February

Table 6. Total fishing effort (h) for all species and total directed expenditures at Lake Tyler East Texas, December 2004 through February 2005, March 2008 through May 2008, and March 2012 through May 2012.

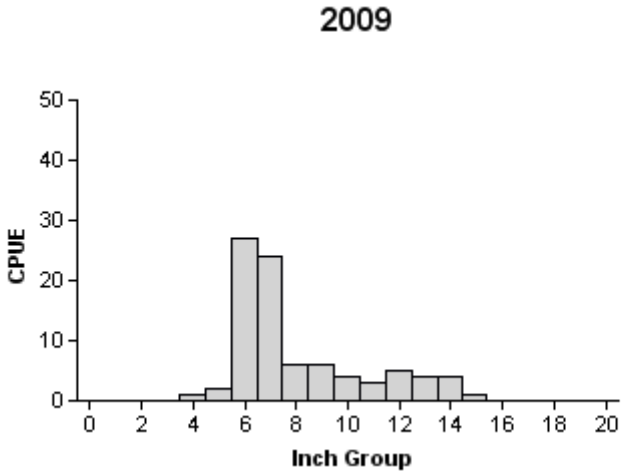
Creel Statistic	Year		
	Winter 2004/2005*	Spring 2008	Spring 2012
Total fishing effort	12,631	35,111	18,843
Total directed expenditures	$37,008	$ 237,881	$192,004

* Winter creel conducted from December through February

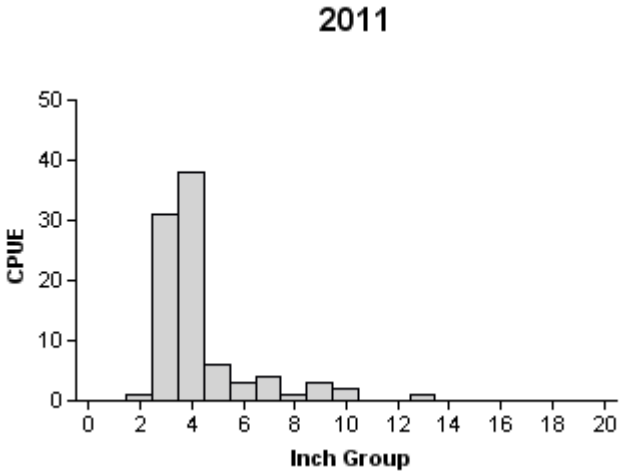
Gizzard shad



Effort =	1.0
Total CPUE =	51.0 (32; 51)
Stock CPUE =	28.0 (44; 28)
PSD =	93 (6.5)
IOV =	45 (14.2)



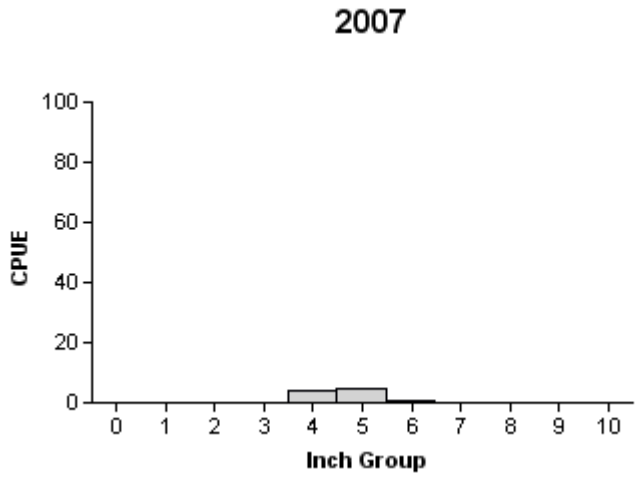
Effort =	1.0
Total CPUE =	87.0 (38; 87)
Stock CPUE =	57.0 (36; 57)
PSD =	30 (5.6)
IOV =	62 (8.9)



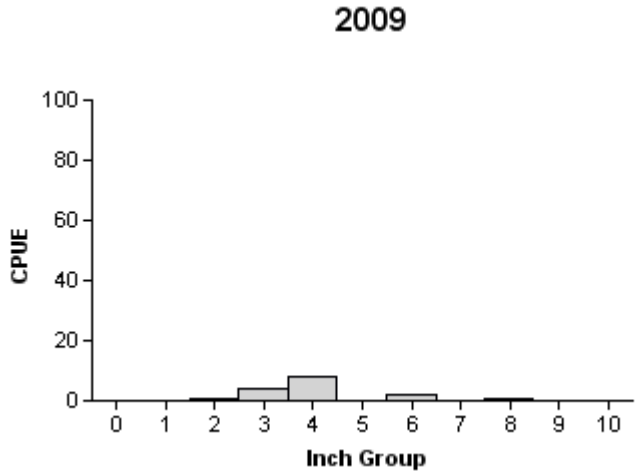
Effort =	1.0
Total CPUE =	90.0 (31; 90)
Stock CPUE =	11.0 (37; 11)
PSD =	9 (8.7)
IOV =	92 (4)

Figure 2. Number of gizzard shad caught per hour (CPUE, bars), and population indices (RSE and N for CPUE and SE are in parentheses) for fall electrofishing surveys, Lake Tyler East, Texas, 2007, 2009, and 2011.

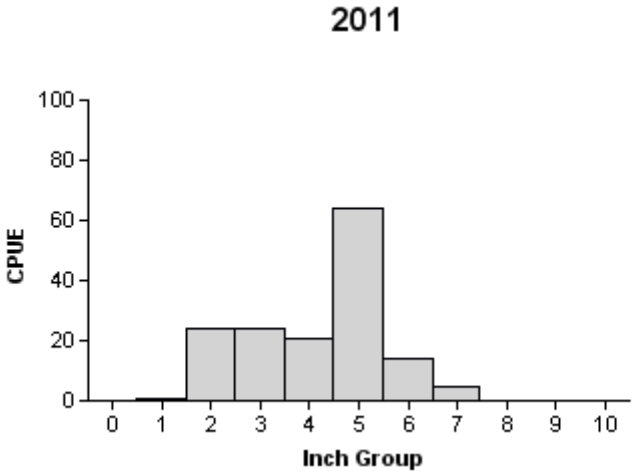
Redbreast sunfish



Effort =	1.0
Total CPUE =	10.0 (39; 10)
Stock CPUE =	10.0 (39; 10)
PSD =	10 (10.6)



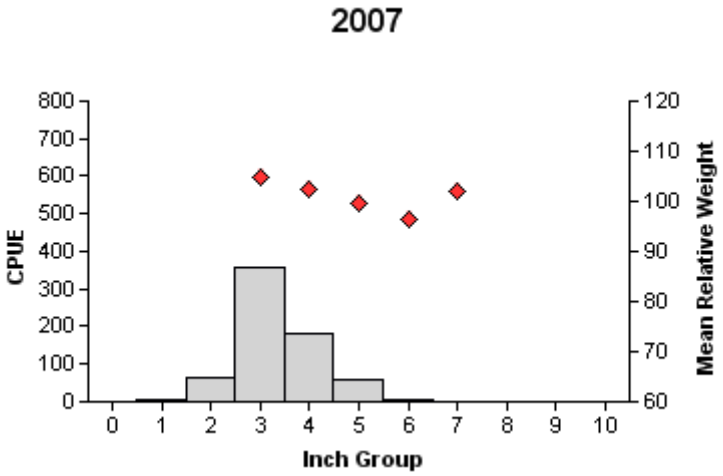
Effort =	1.0
Total CPUE =	16.0 (46; 16)
Stock CPUE =	15.0 (49; 15)
PSD =	20 (6.8)



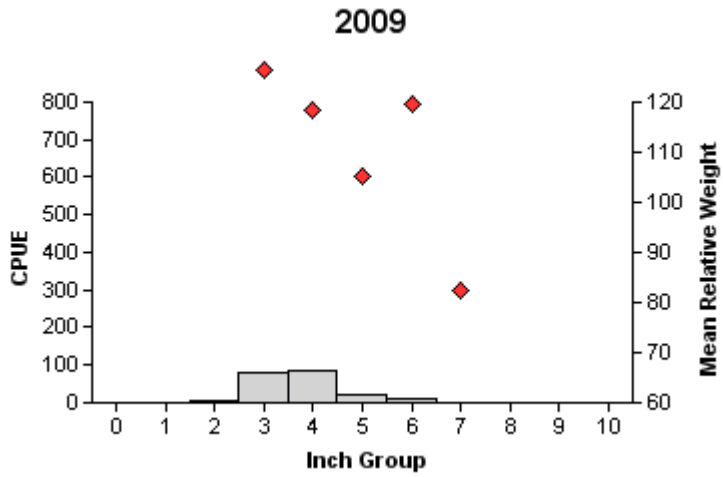
Effort =	1.0
Total CPUE =	153.0 (36; 153)
Stock CPUE =	128.0 (36; 128)
PSD =	15 (4.3)

Figure 3. Number of redbreast sunfish caught per hour (CPUE, bars), and population indices (RSE and N for CPUE and SE are in parentheses) for fall electrofishing surveys, Lake Tyler East, Texas, 2007, 2009, and 2011.

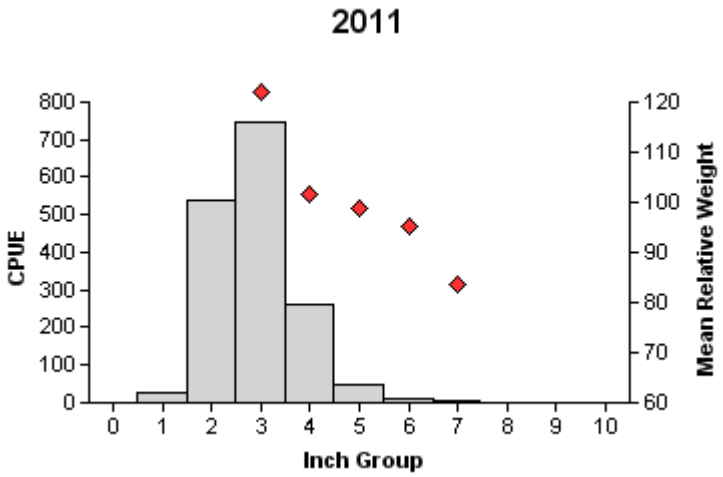
Bluegill



Effort =	1.0
Total CPUE =	676.0 (13; 676)
Stock CPUE =	605.0 (14; 605)
PSD =	1 (0.6)



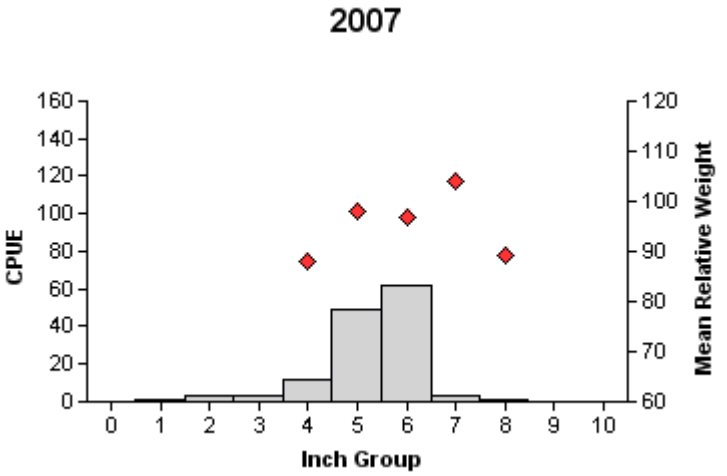
Effort =	1.0
Total CPUE =	204.0 (22; 204)
Stock CPUE =	196.0 (22; 196)
PSD =	5 (1.2)



Effort =	1.0
Total CPUE =	1,633.0 (8; 1633)
Stock CPUE =	1,070.0 (12; 1070)
PSD =	1 (0.4)

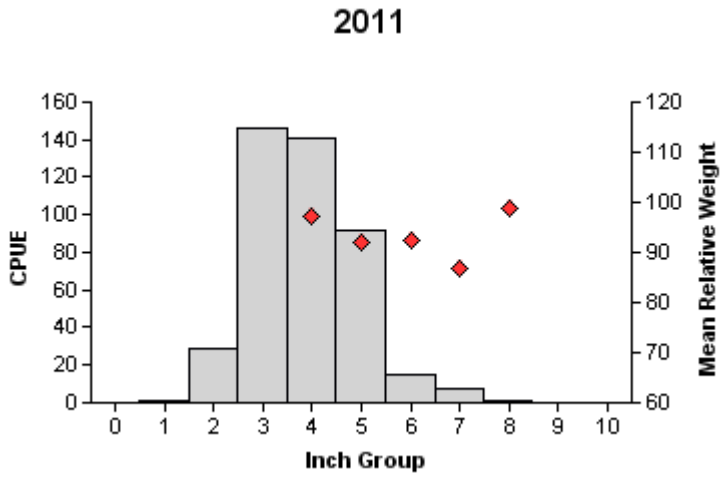
Figure 4. Number of bluegill caught per hour (CPUE, bars), mean relative weight (diamonds), and population indices (RSE and N for CPUE and SE are in parentheses) for fall electrofishing surveys, Lake Tyler East, Texas, 2007, 2009, and 2011.

Redear sunfish



Effort =	1.0
Total CPUE =	134.0 (22; 134)
Stock CPUE =	127.0 (23; 127)
PSD =	3 (1.3)

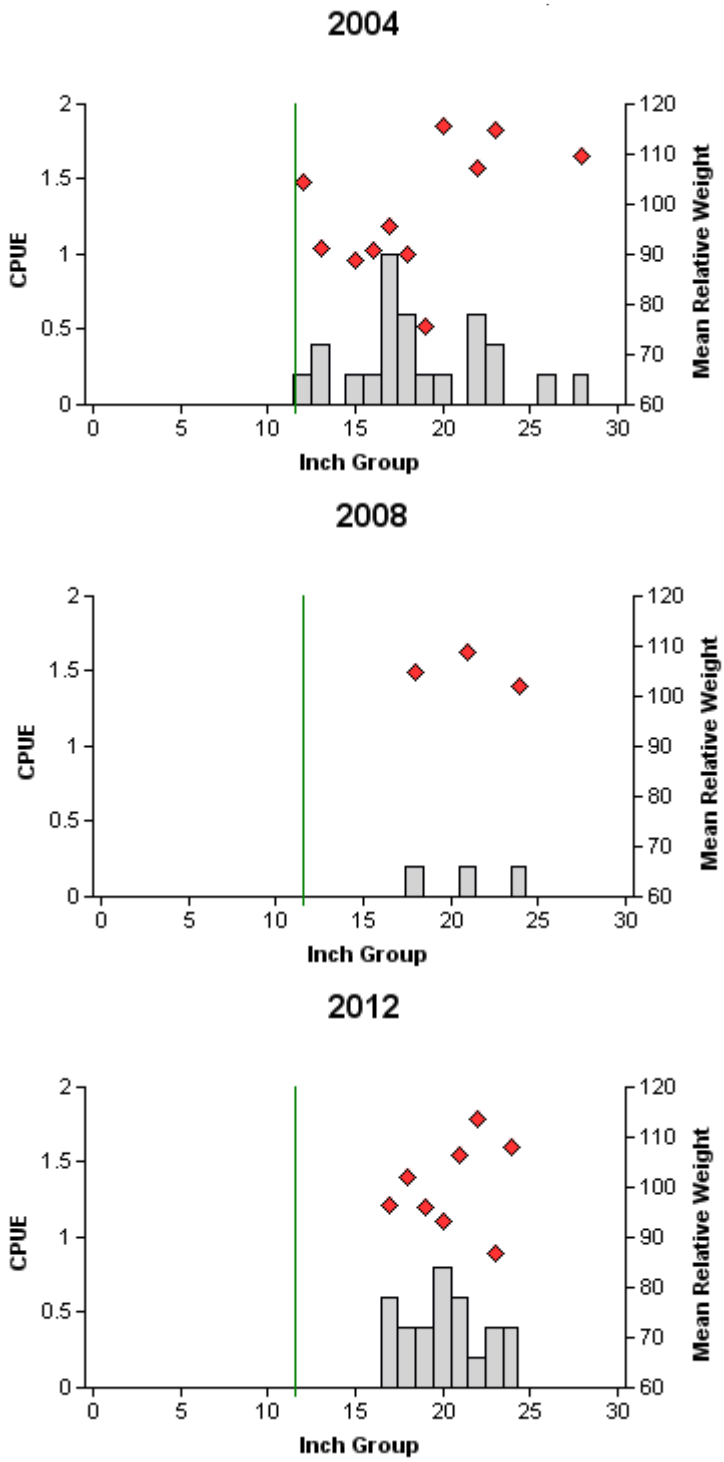
Effort =	1.0
Total CPUE =	41.0 (27; 41)
Stock CPUE =	13.0 (35; 13)
PSD =	8 (8.2)



Effort =	1.0
Total CPUE =	432.0 (31; 432)
Stock CPUE =	256.0 (31; 256)
PSD =	3 (1.6)

Figure 5. Number of redear sunfish caught per hour (CPUE, bars), mean relative weight (diamonds), and population indices (RSE and N for CPUE and SE are in parentheses) for fall electrofishing surveys, Lake Tyler East, Texas, 2007, 2009, and 2011.

Channel catfish



2004	
Effort =	5.0
Total CPUE =	4.4 (50; 22)
Stock CPUE =	4.4 (50; 22)
PSD =	82 (5.3)
PSD-P =	9 (4.2)

2008	
Effort =	5.0
Total CPUE =	0.6 (41; 3)
Stock CPUE =	0.6 (41; 3)
PSD =	100 (0)
PSD-P =	33 (30.4)

2012	
Effort =	5.0
Total CPUE =	3.8 (23; 19)
Stock CPUE =	3.8 (23; 19)
PSD =	100 (0)
PSD-P =	11 (6.1)

Figure 6. Number of channel catfish caught per net night (CPUE, bars), mean relative weight (diamonds), and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for spring gill net surveys, Lake Tyler East, Texas, 2004, 2008, and 2012. Vertical line represents length limit at time of survey.

Channel catfish

Table 7. Creel survey statistics for channel catfish at Lake Tyler East December 2004-February 2005, March-May 2008, and March-May 2012 where total catch per hour is for anglers targeting channel catfish and total harvest is the estimated number of channel catfish harvested by all anglers. Relative standard errors (RSE) are in parentheses.

Creel Survey Statistic	Year		
	Winter 2004/2005*	Spring 2008	Spring 2012
Directed effort (h)	0	450	103
Directed effort/acre	0	0.2	<0.1
Total catch per hour	0	0	0
Total harvest	55 (1,581)	80 (975)	103 (830)
Harvest/acre	<0.1 (1,581)	<0.4 (975)	<0.1 (830)
Percent legal released	0	0	0

* Winter creel conducted from December through February

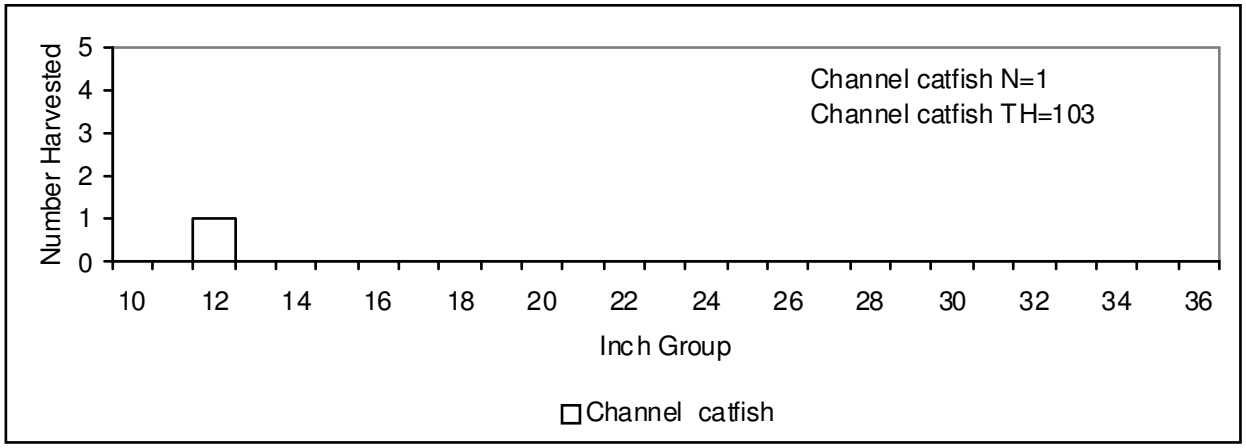
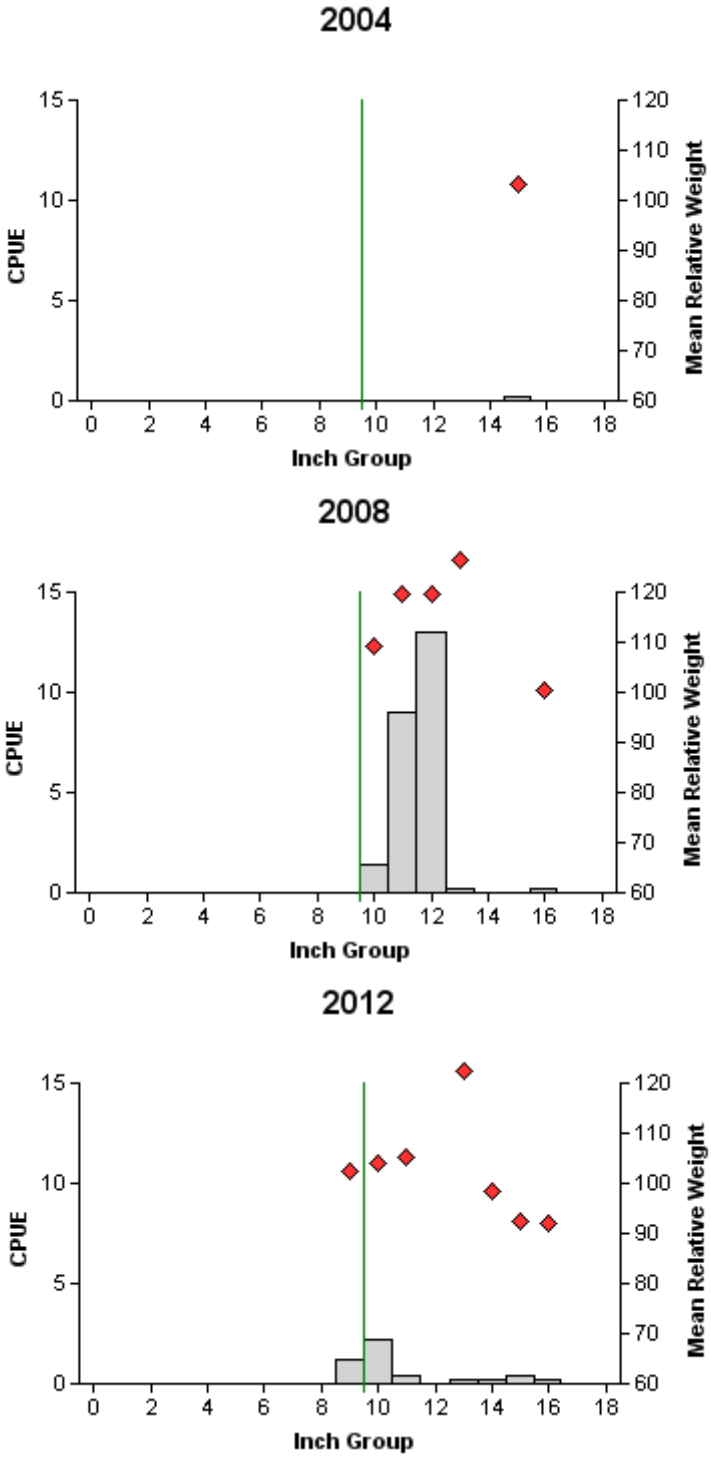


Figure 7. Length frequency of harvested channel catfish observed during creel surveys at Lake Tyler East, Texas, March–May, 2012, all anglers combined. N is the number of harvested catfish observed during creel surveys, and TH is the total estimated harvest for the creel period.

White bass



Effort =	5.0
Total CPUE =	0.2 (100; 1)
Stock CPUE =	0.2 (100; 1)
PSD =	100 (0)
PSD-10 =	100 (0)

Effort =	5.0
Total CPUE =	23.8 (34; 119)
Stock CPUE =	23.8 (34; 119)
PSD =	100 (0)
PSD-10 =	100 (0)

Effort =	5.0
Total CPUE =	4.8 (76; 24)
Stock CPUE =	4.8 (76; 24)
PSD =	100 (0)
PSD-10 =	75 (5.9)

Figure 8. Number of white bass caught per net night (CPUE, bars), mean relative weight (diamonds), and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for spring gill net surveys, Lake Tyler East, Texas, 2004, 2008, and 2012. Vertical line represents length limit at time of survey.

White bass

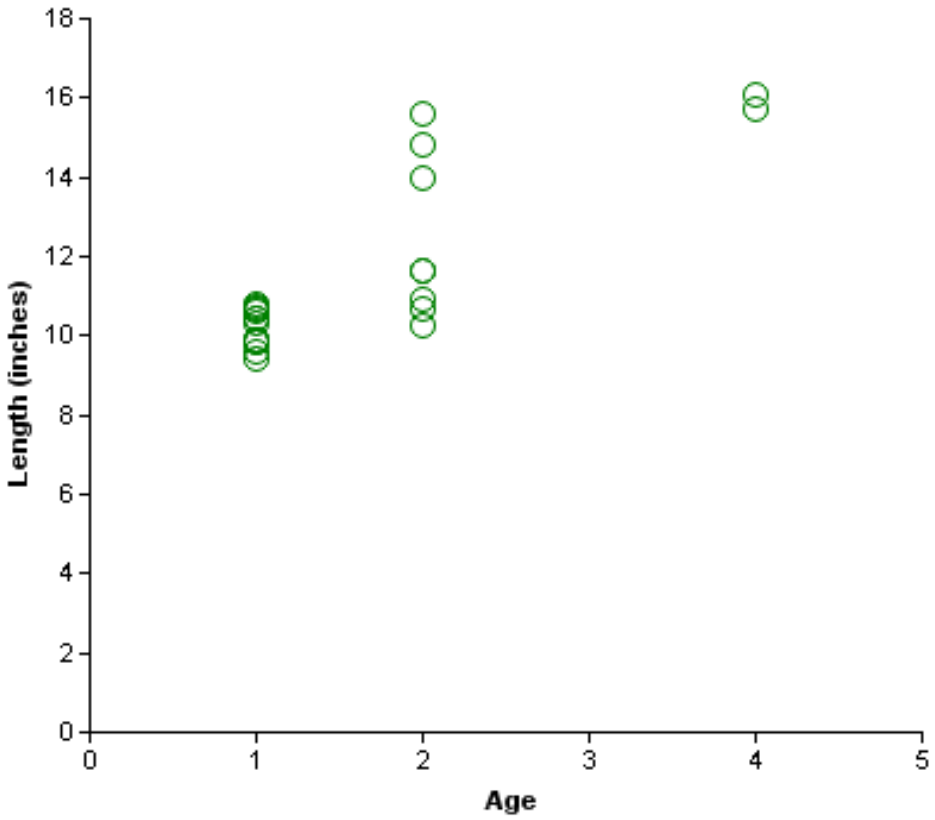
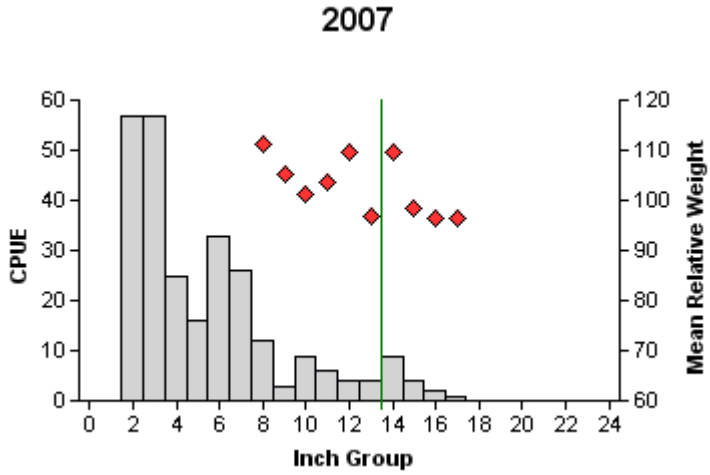


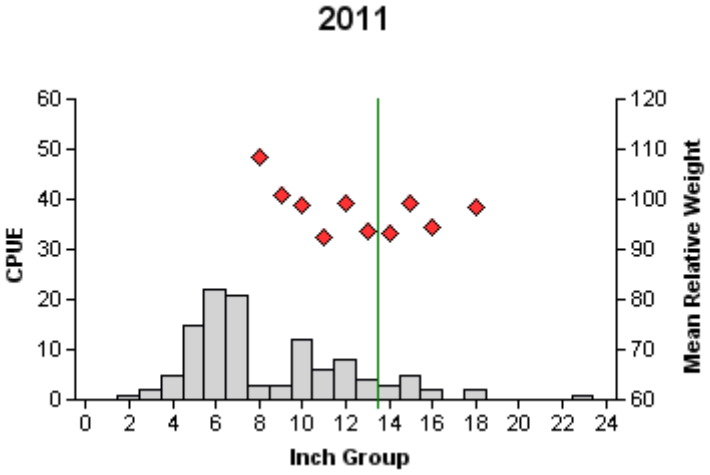
Figure 9. Length at age (inches) of all white bass (N=24) (sexes combined) collected in spring gill netting, Lake Tyler East, Texas, March 2012.

Largemouth bass



Effort =	1.0
Total CPUE =	268.0 (22; 268)
Stock CPUE =	54.0 (27; 54)
PSD =	44 (7.9)
PSD-14 =	30 (7.7)

Effort =	1.0
Total CPUE =	54.0 (18; 54)
Stock CPUE =	40.0 (18; 40)
PSD =	57 (6)
PSD-14 =	18 (4)



Effort =	1.0
Total CPUE =	115.0 (24; 115)
Stock CPUE =	49.0 (20; 49)
PSD =	51 (7.6)
PSD-14 =	27 (8.1)

Figure 10. Number of largemouth bass caught per hour (CPUE, bars), mean relative weight (diamonds), and population indices (RSE and N for CPUE and SE are in parentheses) for fall electrofishing surveys, Lake Tyler East, Texas, 2007, 2009, and 2011. Vertical line represents length limit at time of survey.

Largemouth bass

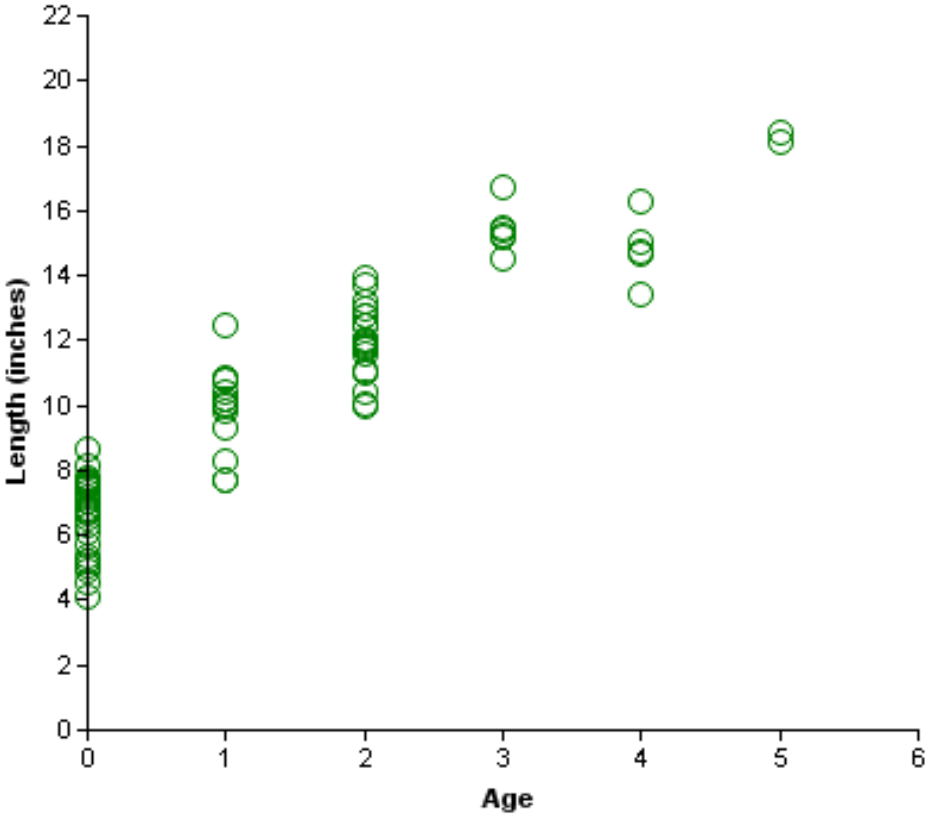


Figure 11. Length at age (inches) of largemouth bass (N=78) (sexes combined) collected in fall electrofishing, Lake Tyler East, Texas, October 2011.

Largemouth bass

Table 8. Creel survey statistics for largemouth bass at Lake Tyler East from December 2004-February 2005, March-May 2008, and March-May 2012 where total catch per hour is for anglers targeting all largemouth bass and total harvest is the estimated number of largemouth bass harvested by all anglers. Relative standard errors (RSE) are in parentheses.

Creel Survey Statistic	Year		
	Winter 2004/2005*	Spring 2008	Spring 2012
Directed effort (h)	6,551 (25)	29,598 (19)	15,129 (23)
Directed effort/acre	2.9 (25)	13.0 (19)	6.6 (23)
Total catch per hour	0.6 (19)	0.9 (20)	1.4 (17)
Total harvest	1,166 (87)	6,284 (58)	4,101 (40)
Traditional harvest	na	na	984 (40)
Tournament retained	na	na	3,117 (40)
Harvest/acre	0.5 (87)	2.7 (58)	1.8 (40)
Percent legal released	na	82	54

* Winter creel conducted from December through February

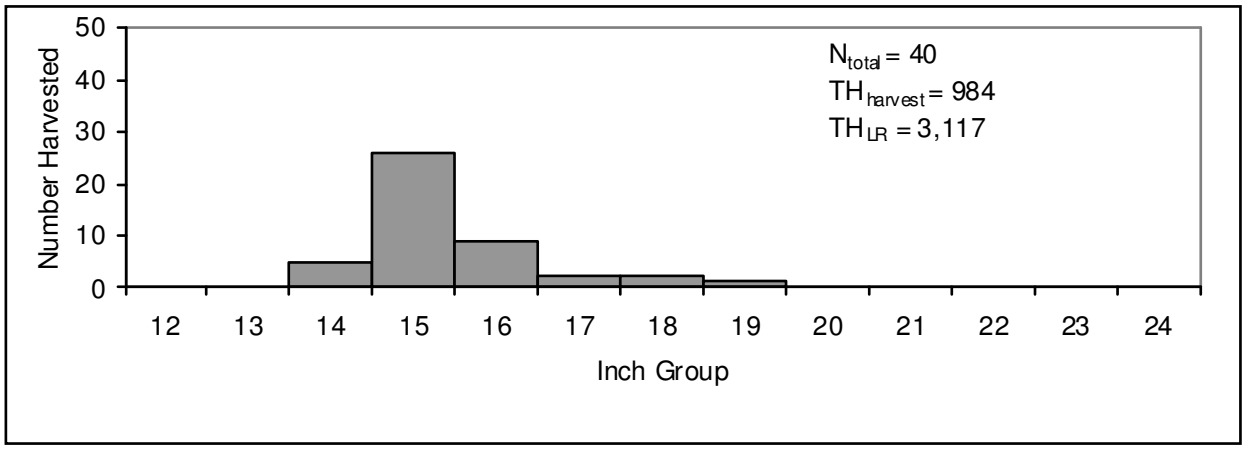


Figure 12. Length frequency of harvested largemouth bass observed during creel surveys at Lake Tyler East, Texas, March–May 2012, all anglers combined. N_{total} is the total number of largemouth bass observed during the angler creel survey. TH_{LR} is the expanded number of largemouth bass in possession by tournament anglers and later released. $TH_{harvest}$ is the expanded number of harvested largemouth bass.

Largemouth bass

Table 9. Results of genetic analysis of largemouth bass collected by fall electrofishing at Lake Tyler East, Texas, 1993, 1996, 1999, 2001, 2007, and 2011. FLMB=Florida largemouth bass, NLMB=Northern largemouth bass, F1=first generation hybrid between a FLMB and a NLMB, Fx=second or higher generation hybrid between a FLMB and a NLMB.

Year	Sample size	Genotype				% FLMB alleles	% pure FLMB
		FLMB	F1	Fx	NLMB		
1993	28	3	3	14	8	35.7	10.7
1996	30	2	13	8	7	37.5	6.7
1999	30	0	6	17	7	30.8	0.0
2001	30	0	7	21	2	42.5	0.0
2007	30	0	na	na	0	42.6	0.0
2011*	30	0	1	29	0	50.0	0.0

* Sample taken from multiple cohorts

White crappie

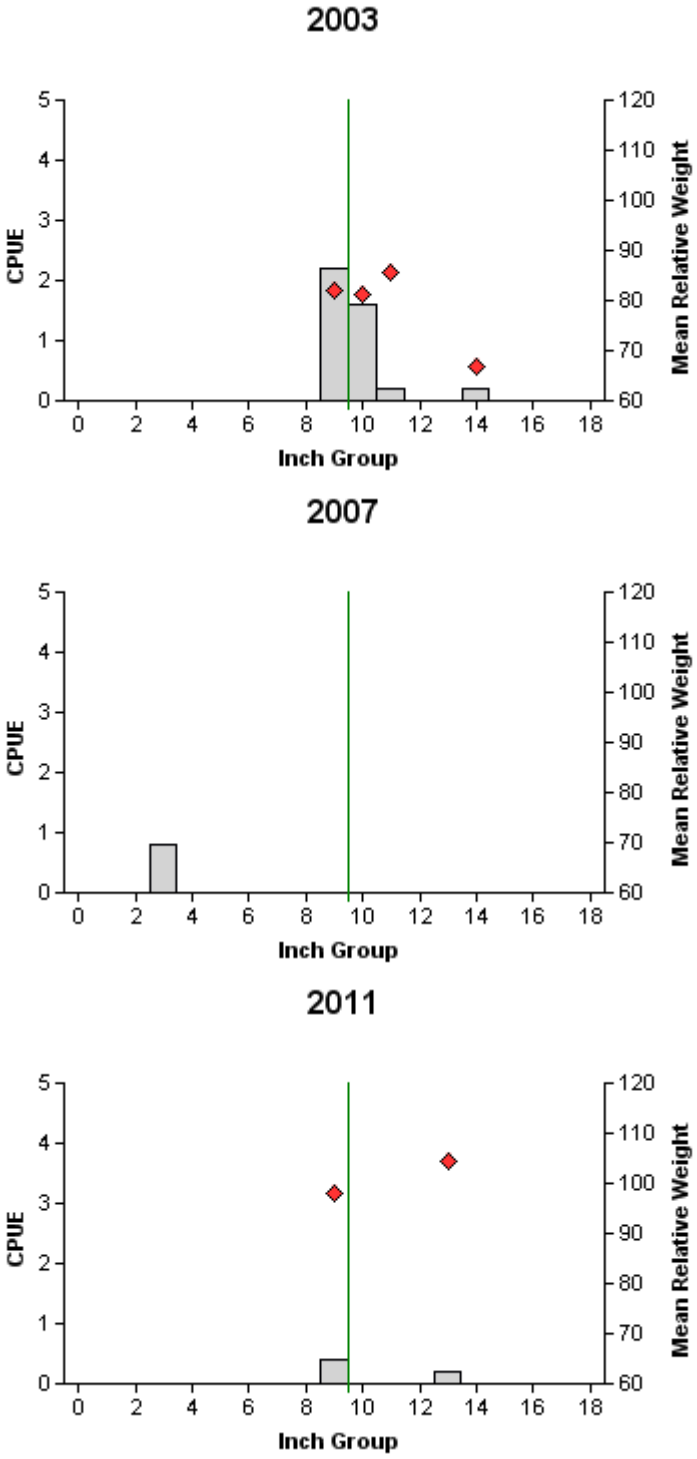


Figure 13. Number of white crappie caught per net night (CPUE), mean relative weight (Wr, diamonds), and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for fall trap net surveys, Lake Tyler East, Texas, 2003, 2007, and 2011. Vertical line represents length limit at time of survey.

Black crappie

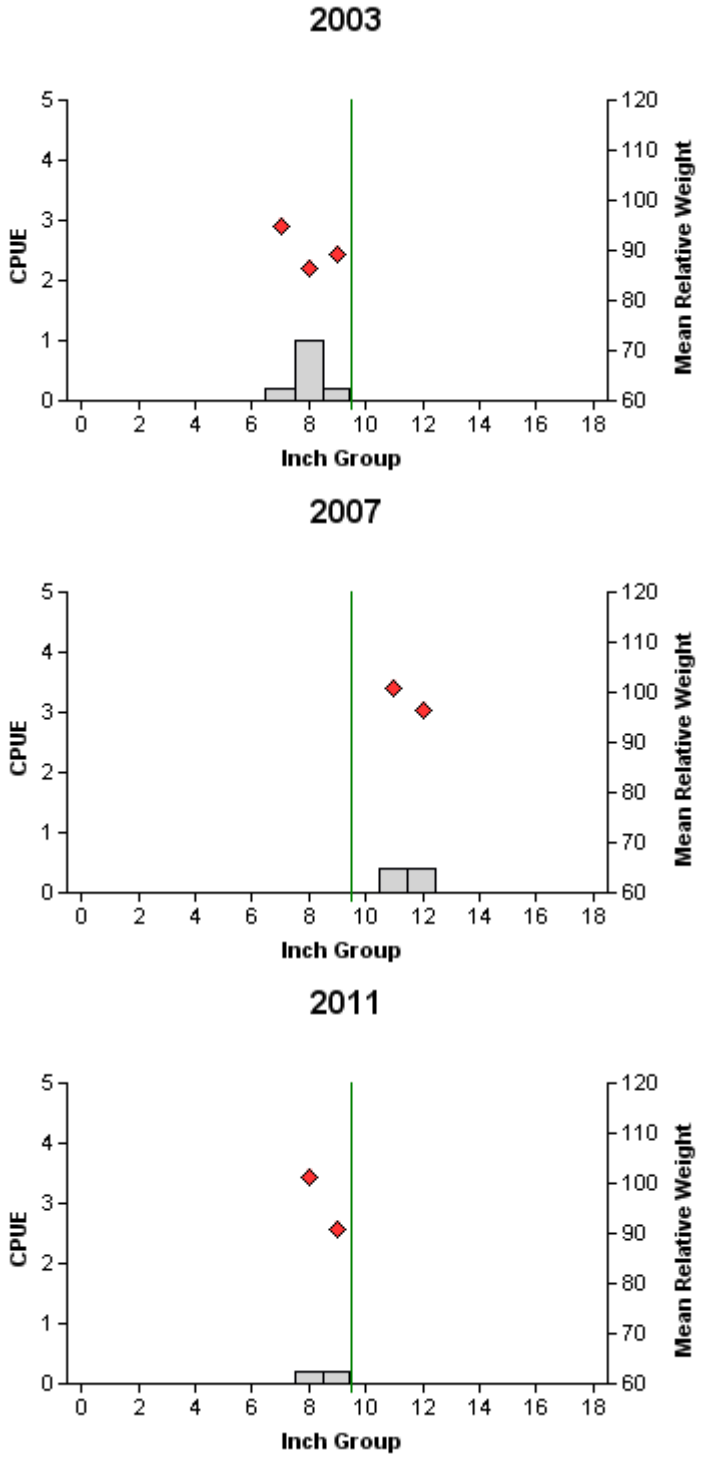


Figure 14. Number of black crappie caught per net night (CPUE) and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for fall trap net surveys, Lake Tyler East, Texas, 2003, 2007, and 2011. Vertical line represents length limit at time of survey.

Crappie

Table 10. Creel survey statistics for crappie at Lake Tyler East from December 2004-February 2005, March–May 2008, and March-May 2012 where total catch per hour is for anglers targeting all crappie, and total harvest is the estimated number of crappie harvested by all anglers. Relative standard errors (RSE) are in parentheses.

Creel Survey Statistic	Year		
	Winter 2004/2005*	Spring 2008	Spring 2012
Directed effort (h)	5,744 (25)	2,208 (42)	1,999 (36)
Directed effort/acre	2.5 (25)	0.9 (42)	0.9 (47)
Total catch per hour	2.8 (16)	1.0 (52)	5.7 (39)
Total harvest	13,429 (46)	2,981 (99)	5,160 (85)
White crappie	7,438 (50)	966(133)	929 (193)
Black crappie	5,991 (40)	2,236 (84)	4,231 (57)
Harvest/acre	5.9 (46)	1.3 (99)	2.3 (85)
White crappie	3.3 (50)	0.4 (133)	0.4 (276)
Black crappie	2.4 (40)	1.0 (84)	1.9 (61)
Percent legal released	0	0	0

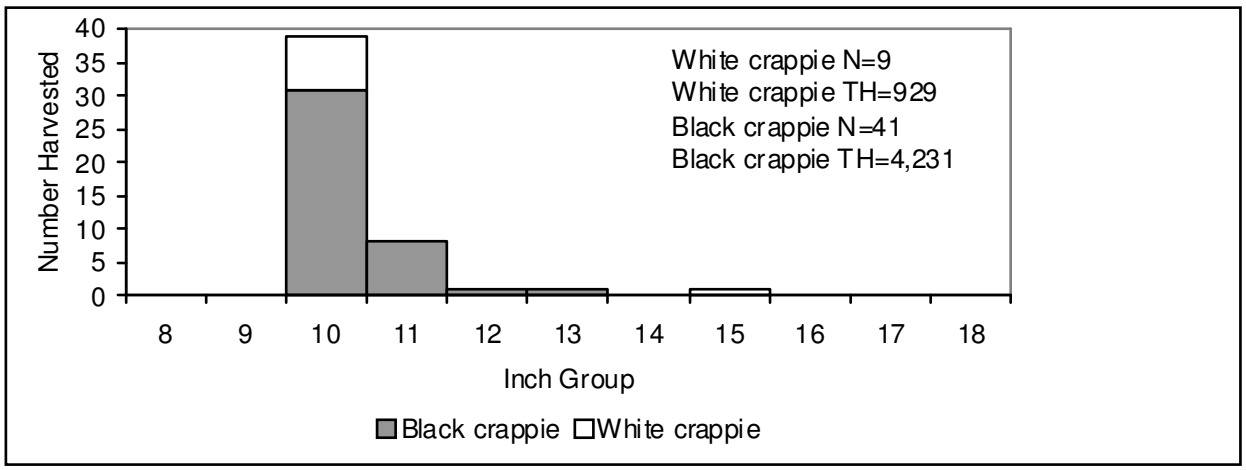


Figure 15. Length frequency of harvested white crappie and black crappie observed during creel surveys at Lake Tyler East, Texas, March-May 2012, all anglers combined. N is the number of harvested white crappie and black crappie observed during creel surveys, and TH is the total estimated harvest for the creel period.

Table 11. Proposed sampling schedule for Lake Tyler East, Texas. Gill netting surveys are conducted in the spring and electrofishing is the fall. Standard survey denoted by S and additional survey denoted by A.

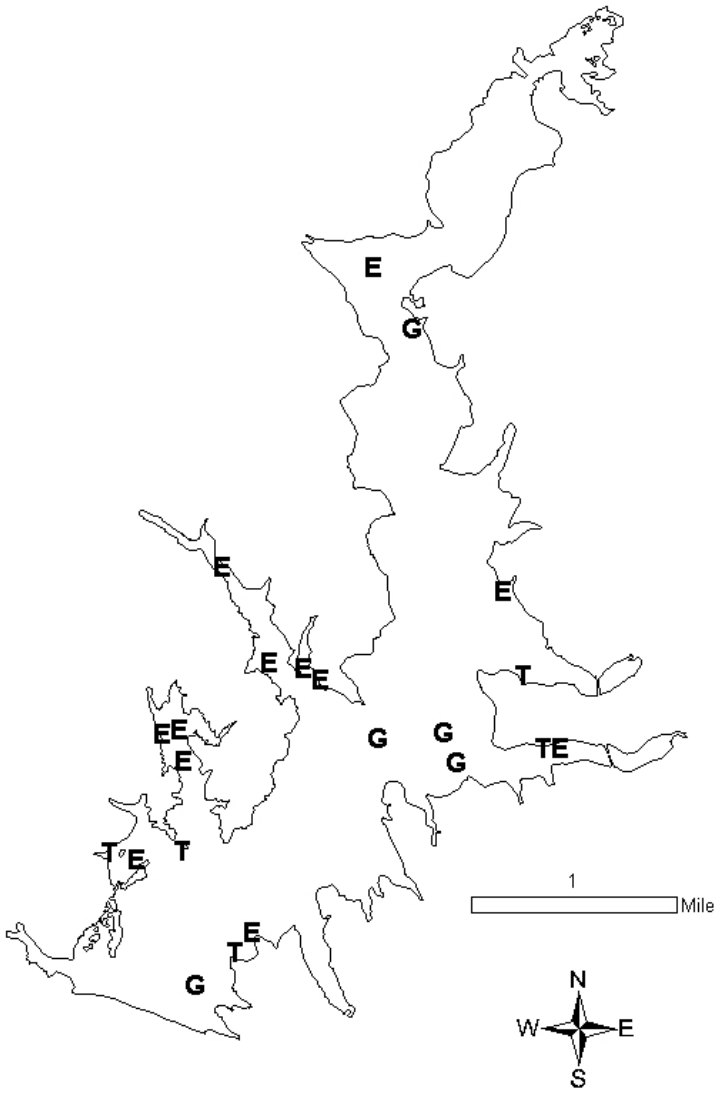
Survey Year	Electrofishing	Access	Gill Net	Habitat	Creel	Report
2012-2013				A		
2013-2014	A			A		
2014-2015				A		
2015-2016	S	S	S	S	A	S

APPENDIX A

Number (N) and catch rate (CPUE) of all target species collected from all gear types from Lake Tyler East, Texas, 2010-2011.

Species	Gill netting		Trap netting		Electrofishing	
	N	CPUE	N	CPUE	N	CPUE
Gizzard shad					90	90.0
Threadfin shad					343	343.0
Channel catfish	19	3.8				
White bass	24	4.8				
Redbreast sunfish					153	153.0
Bluegill					1,633	1,633.0
Longear sunfish					12	12.0
Redear sunfish					432	432.0
Spotted bass					10	10.0
Largemouth bass					115	115.0
White crappie			3	0.6		
Black crappie			2	0.4		

APPENDIX B



Location of sampling sites, Lake Tyler East, Texas, 2011-2012. Trap net, gill net, and electrofishing stations are indicated by T, G, and E, respectively.